PHILOSOPHICAL

TRANSACTIONS.

VIII. *On the Rate of Travelling, as performed by Camels; and its Application, as a Scale, to the Purpoſes of Geography.* By James Rennell, *Eſq. F. R. S.*

Read March 17, 1791.

AMONGST the diſcoveries and improvements of various kinds, that may be expected from the very laudable, and, as it concerns mankind in the groſs, no leſs humane and benevolent inſtitution of AN ASSOCIATION FOR PROMOTING DISCOVERIES IN THE INTERIOR PARTS OF AFRICA, that of the geography of the Continent in queſtion may be expected to make the quickeſt progreſs: ſince, in every kind of diſtant reſearch, whether ſucceſsful or otherwiſe, the act of enquiry alone brings materials to the geographer. But, even with every ordinary

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ordinary advantage, the geography of a continent muſt neceſſarily be ſlow in its progreſs towards maturity; *we*, therefore, can only expect to witneſs its early infancy; and cannot, from a view of the preſent, allow ourſelves to predict what its future features may be. Let it be our care, however, to foſter it; and contribute all within our power towards its improvement and perfection.

In a caſe where there is ſo little probability, even in a long courſe of time, of obtaining many fixed points by celeſtial obſervations (though I hope that one at leaſt will be attempted in the central part of Africa, in our time), it is fortunate that the mode of travelling happens to be ſuch, as ſerves to furniſh a remarkably equal ſcale: the rate of the camel's movement appearing to be, beyond all others, the leaſt variable; whether we examine it by portions of days, or of hours. In the preſent ſtate of things, the former mode alone can be uſed; becauſe few or none of the African travellers carry watches with them: but it may be hoped, that at no very diſtant period, the time employed on the road may be obtained with ſuch a degree of exactneſs, as to furniſh the geographer with materials of a far better kind, than any of thoſe, formed on computation, that have hitherto been exhibited.

Theſe remarks occurred on the reſult of an examination, which (though for a different purpoſe) I lately made into the rate of the camel's movement on the Arabian deſert, between Aleppo, Bagdad, and Buſſorah: for it appeared to me, that if the African caravans are compoſed of the ſame kind of camels, and are governed in their motions and œconomy by the ſame circumſtances, as thoſe which croſs the Arabian deſerts; there is no ſcale, of the computed kind, that can be more applicable to the African geography, than that formed on the camel's rate

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of travelling. I ſhall therefore detail the examples from whence I have drawn the proportions for the hours and days journey of the camel, under the two different degrees of burthen, which conſtitute what is commonly denominated the LIGHT, and the HEAVY caravan.

The routes which furniſh the above examples are determined in their horizontal, or direct diſtance, by the reſpective poſitions of ALEPPO, BAGDAD, and BUSSORAH: all of which have their latitudes and longitudes fixed by celeſtial obſervations *. Theſe routes are five in number: and although ſome of the journals that deſcribe them, contain leſs information than others, yet all of them have the time given with a ſufficient degree of preciſion, to enable me to found a general rule on. Three of theſe routes lead acroſs the GREAT DESERT, or that between Aleppo and Buſſorah; the other two are acroſs the LITTLE DESERT, or that between Aleppo and Bagdad.

The firſt of the Great Deſert routes was traced by a Mr. CARMICHAEL in 1751. The manuſcript copy of his Journal was obligingly communicated by my friend Dr. PATRICK RUSSELL; and it manifeſts a great degree of ingenuity and perſeverance in this way. The Author declares, that he was determined to keep a regiſter of the courſes by a compaſs, and to compute, comparatively, if not abſolutely, the intermediate diſtance on each courſe; by counting the ſteps or paces of the camel on which he rode, during a certain interval of time; and afterwards meaſuring a number of them on the ground. The particulars of this operation ſhall be given hereafter; and

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* Aleppo, in Conn. des Temps, lat. 36° 11′, long. 37° 9′, reckoned from Greenwich.

Bagdad, by M. BEAUCHAMP, lat. 33° 22′, long. 44° 21′, Greenwich.

Buſſorah, by Capt. RITCHIE, lat. 30° 30′, long. 47° 33′, Greenwich.

although Mr. Carmichael failed in the attempt to aſcertain his road diſtance by this method, yet his proceſs has furniſhed others with the means of aſcertaining the whole diſtance in the aggregate, and of proportioning the parts throughout. For, as the direct diſtance is given by the celeſtial obſervations, and a complete traverſe table by the journal, the *data* are perfect. And when the reader is informed that Mr. Carmichael's whole line of bearing, *by compaſs*, between Aleppo and Buſſorah, nearly 720 Britiſh miles, coincided with the bearing line given by the celeſtial obſervations; by which it appears that the error could amount only to the mean quantity of the variation throughout, which might have been from ſix to ſeven degrees at that time (1751); he will give Mr. Carmichael credit for much general accuracy. And it is not improbable, that even a conſiderable portion of the above error may have ariſen from the imperfection of his inſtrument [*].

The ſecond journal was kept by Colonel Capper, in 1778, and was publiſhed ſeveral years ago; and the third, which contains little more than the time in detail, was communicated by my friend Mr. Hunter, who croſſed the deſert in 1767.

The time given between Aleppo and Buſſorah, by theſe journals reſpectively, is as follows:

By Mr. Carmichael .	322 hours.
Colonel Capper .	310
Mr. Hunter .	299½

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[*] I find, by Mr. Drummond's chart of the road between Aleppo and Antioch (1747), that the variation was then about 6 degrees weſterly. This is proved by comparing his magnetic bearing line between thoſe places, with that given by the difference of latitude In the head of the Gulf of Perſia, the variation was 7 degrees in 1785.

But to ſhew that this difference aroſe chiefly from the variations in the route acroſs the CHALDEAN DESERT (between Mesjid Ali and Buſſorah; ſee the annexed ſketch, Tab. III.), I ſhall proceed, firſt, to explain that part of the ſubject; and afterwards to exhibit the particulars in proof.

Mesjid Ali (or Ali's Moſque) is ſituated at about two thirds of the diſtance, and as nearly as poſſible in the line of direction, between Aleppo and Buſſorah; and is a ſort of land-mark to the caravans which paſs the common boundary of the Arabian and Chaldean deſerts. Its geographical poſition is deduced from bearings and latitudes taken by M. NIEBUHR and others: and therefore, as far as general geography is concerned, it may almoſt be regarded as a fixed point. Not that the truth of its poſition will in any ſhape affect the preſent head of enquiry; which is entirely directed towards a compariſon of the ſpaces of time, employed between certain points of the route, by each traveller reſpectively.

Now, that portion of the Deſert route between Mesjid Ali and Buſſorah, being ſubject to great variation in the track, as appears by the journals of different travellers; whilſt the much larger portion of it, between Mesjid Ali and Aleppo, is very nearly the ſame at all times; it is very clear, that this latter portion furniſhes the propereſt ground on which to form the compariſon: and the particulars are as follow:

	CARMICHAEL.	CAPPER.	HUNTER.	
	H. M.	H. M.	H. M.	
Aleppo to Hagla .	11 5	11 24	10 0	Hagla.
Hagla to Ain il Koom .	37 30	41 4	35 0	to Taiba.
Ain il Koom to Uklet Hauran	80 10	78 41	81 30	to Uklet Hauran.
Hagla to Uklet Hauran .	117 40	119 45	116 30	
Uklet Hauran to Al Kadder	53 50	54 45	51 30	
Hagla to Al Kadder .	171 30	174 30	168 0	
Al Kadder to Rackama, oppoſite Mesjid Ali .	21 45	19 50	19 30	
Hagla to Rackama .	193 15	194 20	187 30	
Aleppo to Rackama .	204 20	205 44	197 30	

On the Little Deſert I have two examples of time, from Mr. IRWIN in 1781, and Mr. HOLFORD in 1780; both of whom kept regular journals.

	IRWIN.	HOLFORD.
	H. M.	H. M.
Aleppo to Ain il Koom.	52 0	46 27
Ain il Koom to Annah on the Euphrates . .	76 0	80 15
Aleppo to Annah . . .	128 0	126 42

It appears by the journals, that Mr. IRWIN deviated from the uſual track in the firſt part of his route; and that Mr. HOLFORD did the like in the latter part of his; each to avoid an enemy; ſo that it may be preſumed, that the deviations nearly balanced each other (ſee the ſketch).

Between Annah and Bagdad, theſe gentlemen made part of their journey in the caravan of loaded camels, and partly with *light* camels (that is, without any other load than the rider). Mr. IRWIN employed 62½ hours: but the laſt 15 hours, on light camels, were at an accelerated rate of half a mile *per* hour, or one fifth part, above the ordinary rate; according to his idea, which I have no doubt was a very juſt one: and this accelerated rate ſhould add 3 hours to the 15, to reduce it to caravan time; making 65½ hours inſtead of 62½. Mr. HOLFORD's journey, by the ſame *ratio*, muſt be reckoned at 68: but as this part of the two journies is obviouſly too inaccurate to draw any concluſions from, in the way of compariſon, I ſhall only make uſe of Mr. IRWIN's time (to which no ſolid objection can be urged) when I calculate the rate of the camel's travelling.

We have now ſeen, that on a journey of about 200 hours, between Aleppo and Mesjid Ali, two accounts differ only 1 hour 24 minutes; and a third differs from the mean of the other two ſeven hours and an half. And we may obſerve, that if the ſtage from Aleppo to Hagla be taken out of the queſtion, the number of Mr. HUNTER's hours would be nearer on an equality with the others by about an hour and a quarter (ſee p. 134.). The reaſon of the different reports of the diſtance between Aleppo and Hagla, appears to be, that travellers commonly join the caravans either at Hagla or on the road to it; and they, travelling by a quicker conveyance than camels afford, and then adjuſting the time to the caravan rate, make different eſtimates of the diſtance. Or there may be ſome other cauſe which has not been explained. Four different perſons give the time as follows:

	H.	M.		H.	M.
CARMICHAEL	11	5	CAPPER	11	24
HUNTER	10	0	HOLFORD	9	12

So that the proper point of outſet in making the compariſon, is is Hagla. And, reckoning from thence, we have in the firſt table (p. 134.) the numbers $193\frac{1}{4}$, $194\frac{1}{3}$, and $187\frac{1}{2}$, for the time between Hagla and Mesjid Ali, in the three journies reſpectively: and the ſame table affords alſo the following comparifons between different places on the route:

In one inſtance, $80\frac{1}{6}$, and $78\frac{2}{3}$;
In a ſecond, . $117\frac{2}{3}$, $119\frac{3}{4}$, and $116\frac{1}{2}$;
In a third, . $53\frac{3}{4}$, $54\frac{3}{4}$, and $51\frac{1}{2}$;
And in a fourth, $171\frac{1}{2}$, $174\frac{1}{2}$, and 168.

Again, between Aleppo and Annah on the Euphrates, the numbers in the ſecond table ſtand thus:

128, and $126\frac{2}{3}$.

I think I need not produce any more examples to prove the equal rate of motion of a camel that is in any degree loaded; or rather of a number of camels together, where the rate will be determined by the *ſlow-going ones:* and whatſoever rate, in actual diſtance, may be deduced from theſe examples, muſt be applied to loaded camels travelling in a body together, and not to light camels, or thoſe choſen for ſpeed, whoſe rate appears to be at leaſt $\frac{1}{5}$th greater. By a light camel is meant one that has only a man, or a very ſmall quantity of baggage, on it; whereas a camel's load is 500 to 600 pounds; and camels ſo loaded, form what is termed the HEAVY caravan. LIGHT caravan, on the contrary, is applied to camels under a *moderate* load, or perhaps little more than half loaded. And with reſpect to camels, either *moderately* or *fully loaded*, I can perceive no difference in their hourly rate of motion: the difference alone appears in the length of their day's journey; as we ſhall perceive hereafter. A camel, it is ſaid, will not permit himſelf to be over-laden; and this may be the reaſon why the load does not affect his rate of motion.

It appears, that the direct diſtance between Aleppo and Buſſorah, is 621 geographic miles, or 720 Britiſh, nearly. And Mr. CARMICHAEL's route, traced by a compaſs through all its principal bendings, and calculated trigonometrically, gives 688 geographic miles, or of Britiſh 797. It follows then, of courſe, that as the ſame gentleman was 322 hours on the road, the mean hourly rate of the camel's motion, was 2,475 Britiſh miles. Colonel CAPPER's route, though eaſily traced on the map, is not correct enough in its particulars, to ſerve as an authority equal to Mr. CARMICHAEL's; and the like may be ſaid of Mr. HUNTER's: but they muſt both be allowed to corroborate Mr. CARMICHAEL's in a general way; for as nearly as Colonel CAPPER's route can be traced, over the CHALDEAN Deſert (and, as we have before obſerved, the track is nearly the ſame at all times, in all other parts of the Deſert) the hourly rate of his camels was 2,51 *per* hour; and that of Mr. HUNTER's 2,585.

We come now to the LITTLE DESERT route. It has been noticed, that Mr. IRWIN employed 128 hours on his journey from Aleppo to Annah; and 65½ more (allowing for his accelerated rate 3 hours, ſee p. 135.) between Annah and Bagdad; altogether 193½ hours between Aleppo and Bagdad. The direct diſtance between thoſe places is 393 geographic miles; and by the route traced by Mr. IRWIN, the *road diſtance* comes out about 414½, or Britiſh miles 480 *. And this number, divided by 193½, gives 2,48 *per* hour for the camel's rate; or within a very ſmall fraction of Mr. CARMICHAEL's rate; his being, as we have juſt ſeen, 2,475.

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* Not that the diſtance between thoſe places is ſo much as 480 miles by the direct road: it is probably leſs than 470. But Mr. IRWIN's party took a circuitous courſe to the ſouthward, between Aleppo and Ain il Koom, to avoid an enemy that lay in the way. He eſtimated his diſtance at 493 miles.

I think I may venture to reſt the calculation of the loaded camel's mean hourly rate of travelling, on the experiments of Mr. CARMICHAEL and of Mr. IRWIN; both of whom appear to have taken much pains with the detail of their journies*; and then it will ſtand as under:

Mr. CARMICHAEL on 322 hours	2,475	Mean 2,478 Britiſh miles.
Mr. IRWIN on 193½ . .	2,48	

We have mentioned above, the reſult of Colonel CAPPER's and of Mr. HUNTER's time, which gave a rate ſo very near to CARMICHAEL's and IRWIN's: and it may not be amiſs to add to theſe, the reſult of Mr. HOLFORD's; as well as the eſtimates of the camel's rate, formed by ſeven different perſons. All theſe I have placed in one point of view, in the following table.

	CARMICHAEL.	IRWIN.	CAPPER.	HUNTER.	HOLFORD.	PLAISTED.	Anonymous.
	Brit. mi.						
Eſtimated rates	2,29	2,55	2,25	2,33	2,24	2,3	2,5
Experiments	2,475	2,48	2,51	2,585	2,5	——	——

Mean of the ſeven eſtimates,	2,35.
Mean of the five experiments,	2,51.
Mean of CARMICHAEL's and IRWIN's,	2,478.

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* Mr. IRWIN alſo took the bearings of his courſe by a compaſs, though not ſo much in detail as Mr. CARMICHAEL; but Mr. IRWIN not only remarked the time, but the particular rate of travelling, on each day; which appeared to vary from 2 to 3 *per* hour, but was commonly 2½; and the mean of all 2,55 Britiſh miles.

Before I quit the ſubject of the hourly rate, I ſhall obſerve, that the road diſtances in Mr. CARMICHAEL's traverſe table are often thrown together in lines of very conſiderable length, ſuch as 20 miles and upwards; and very commonly in lines of 5, 6, and 7, and yet are all conſidered as ſtraight lines. By this mode, it is probable, that many ſmall inflexions paſſed unnoticed: and therefore the rate taken from the reſults of CARMICHAEL's and IRWIN's obſervations, will be rather under the mark than otherwiſe; but it is obvious, that no kind of rule can be found to correct it by. It is certain, that fewer inflexions are likely to occur in the Deſert routes, than in almoſt any other; not to mention that the long lines of diſtance happen chiefly in the open, level part of the route. The road diſtance exceeds the direct diſtance, by *one-fourteenth part* of the latter only, between Aleppo and Mesjid Ali; amounting to a fraction of ,168 Britiſh mile on each hour; or in the proportion of 7¼ miles on each hundred of direct diſtance. This, I confeſs, is much leſs than I could poſſibly have ſuppoſed; and which nothing ſhort of actual experiment could have induced me to believe. On the whole road between Aleppo and Buſſorah, the proportion is nearly 11 on each hundred, on CARMICHAEL's route: but his route over the Chaldean Deſert was unuſually circuitous; and cannot be admitted to have any weight, in the determination of this queſtion.

One would expect that the inflexions of which no account is taken by Mr. CARMICHAEL, would amount to at leaſt half as much as thoſe which are taken notice of; and ſuch addition would make the whole hourly rate 2,56 inſtead of 2,475. But this is merely a ſuppoſition; and it is poſſible, that the rate may not be higher than 2,52, the mean of the four other experiments.

ments. At all events, the error can be but ſmall: and poſſibly, all circumſtances taken into the caſe (and particularly this remarkable one, that of three perſons who attempted to aſcertain the rate, by counting and meaſuring the camel's footſteps, none reckoned it higher than 2⅓, and one went ſo low as 2¼), I think the rate of two miles and an half *per* hour may be uſed, as differing but a ſhade from the general reſult; and as having the moſt manageable fraction.

Thus it appears to me, that the hourly rate of the camel may be applied as a very uſeful ſcale to the African geography; whenſoever the uſe of watches ſhall be adopted by the native travellers employed by the AFRICAN ASSOCIATION *; and with ſtill greater advantage, of courſe, if Europeans are employed. And if Mr. CARMICHAEL could deſcribe the general bearing, on a line of more than 700 Britiſh miles, ſo nearly as within 6 or 7 degrees of the truth; and that with a pocket compaſs; nothing more need be ſaid concerning the advantages that may be derived from the uſe of that valuable inſtrument, aided by ſuch a ſcale as I have been deſcribing.

The mean length of the day's journey of the camel, varies according to the degree in which it is loaded: and in this particular it is that the ſtate of the camel, as to its burthen, operates on its progreſs. It is neceſſary to obſerve, that whatſoever remarks I may offer, on the ſubject of the camel's day's journey, are meant to be applied only to the *mean* rate on journies of conſiderable length; ſince any other kind of experiment would be of no uſe in geography: I ſhall therefore conſider only the progreſs of the LIGHT and HEAVY CARAVANS, in which the camels are left to purſue their journey quietly and at leiſure; and with the regularity of a machine: and not that of the LIGHT CAMELS, which are not only freed from incumbrance, but are alſo urged on.

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* In the Memoirs of ABDUL KURRIM, a Caſhmerian of diſtinction, he informs us, that he kept an account of the time, on the road between *Bagdad* and *Mecca*, by means of an European watch, in the year 1740.

I have two examples of the heavy kind, and three of the light kind, where the time has been regularly kept: beſides a third example of the heavy kind, where the neceſſary regularity is wanting, but yet containing within itſelf, evidence ſufficiently ſtrong to corroborate the other two.

	H.	M.
The HEAVY caravans were thoſe of Mr. CARMICHAEL and M. HOLFORD; the firſt of 1000 camels, of which 600 were loaded, went, on a journey of 45 days, at a mean, each day, ...	7	10
The ſecond, with 50 loaded camels, on a journey of 15 days	7	40
Mean of the two,	7	25
The third, TEIXEIRA, with 130 loaded camels, on a journey of 21 days, *about* . . .	7	30
Mean of all, *per* day,	7	27

The LIGHT caravans were,

			H.	M.
Meſſ. IRWIN,	from 80 to 100 camels,	21 days,	9	12
CAPPER,		33 —	8	38
HUNTER,		34 —	8	45
		Mean of the three	8	52

Here then the mean of the heavy caravan day is under ſeven hours and an half; and that of the light caravan between eight and three quarters, and nine hours.

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Some of the ordinary watering places on the Deſert, being from 3 to 5 days journey aſunder, it may be ſuppoſed, that the length of the intermediate journies, would be determined by the known and approved ſtandard of a proper day's walk for a camel: for as they often arrive at the watering-place early in the day, it appears, that the caravan chiefs, do not, by any means, divide the ground between ſuch watering places, into equal portions for marches. This being the caſe, one may expect to arrive at the knowledge of what is at leaſt *intended* for a proper day's journey for a camel, under the circumſtances of the caſe: and indeed the reſult is ſuch as to prove what I have before advanced, reſpecting the length of the mean journies of both kinds. For having ſelected from the five above-mentioned journals, the length of the *apparently optional* journies in each; it appears, that the heavy caravans went 7 h. 51 m. on a mean of 24 ſuch days: and the light caravans 9 h. 8 m. on a mean of 38 days. In both of which caſes, as might have been expected, the length of the mean *optional* day, is ſomewhat longer than that of the whole journey; in which there is a wider field for delays and accidents. The compariſon is as follows:

	Heavy caravan.			Light caravan.		
		Diſtance in Britiſh miles.			Diſtance in Britiſh miles.	
	H. M.	at 2½ *per* hour.	at 2,56	H. M.	at 2½ *per* hour.	at 2,56.
Mean daily rate of the whole journey . .	7 27	18,64	19,06	8 52	22,17	22,7
Of optional days . .	7 51	19,62	20,1	9 8	22,8	23,38

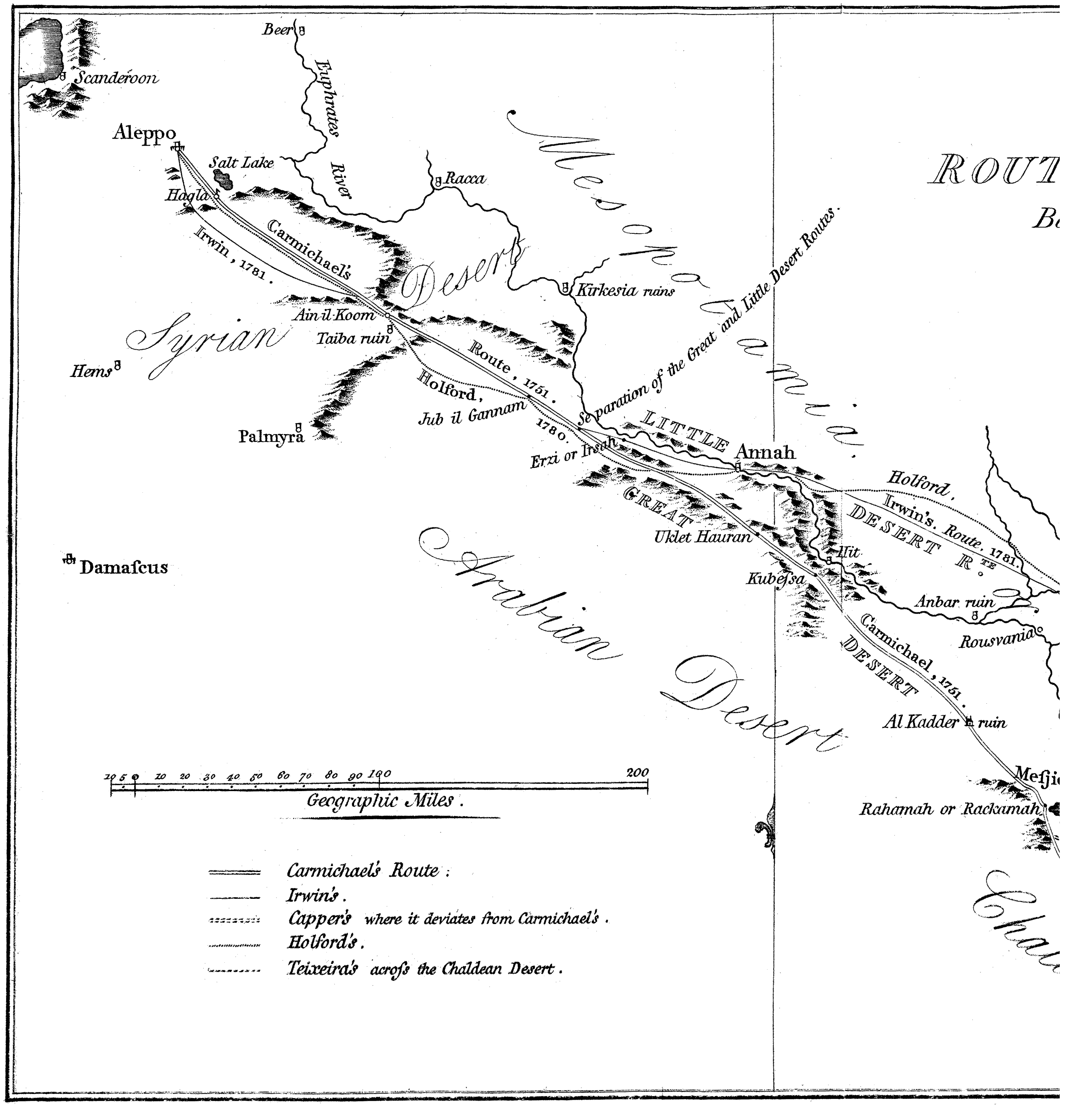
Thus the mean daily rate of the heavy caravan, appears to be 18,64 Britiſh miles, reckoning two miles and an half for each hour; and 19,06 if taken at 2,56: and the mean rate of the light caravan 22,17 miles, at 2½; 22,7 at 2,56.

In order to apply this ſcale with effect, to the African geography, it is neceſſary to ſtate the number of days that the caravans uſually halt on the road; for as yet I have only conſidered their rate of motion: but it is evident, that if the length of the journey in the groſs, is given, the requiſite information will not be obtained, without a previous knowledge of the time loſt by neceſſary, or unavoidable halts on the road. My enquiries have furniſhed me with an account of 13 halts, to 149 days of travelling; or, which is the ſame thing, 13 halts out of 162 days, reckoned from the time of departure, to the time of the arrival of the caravans at the place of deſtination: that is, 1 halt to 12½ travelling days. This, of courſe, muſt be deducted from the aggregate of the diſtance: or, ſhould it be averaged on each day, the heavy caravan day muſt be reckoned at 17,14 miles inſtead of 18,64; and that of the light caravan 20,4, inſtead of 22,17; when the hourly rate is taken at two miles and an half.

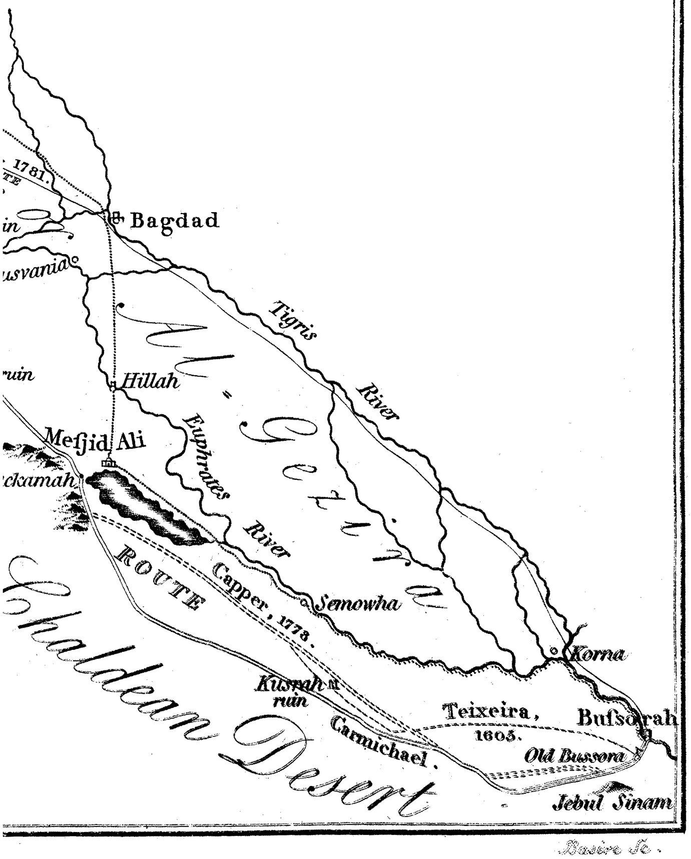
It alſo remains to be ſtated, from the proportion that the road diſtance bore to the direct diſtance, by the trace of Mr. CARMICHAEL's route; what length in direct diſtance, and in geographic miles, may be allowed for each day, for the heavy caravan, on ſimilar lengths of journey, and over ſimilar tracts of country. It appears then, that on the 28 days between Aleppo and Rackama (oppoſite Mesjid Ali) the mean length of the day's journey, in direct diſtance, is about 15¼ geographic miles: and on the whole 45 days between Aleppo and Buſſorah, 13,8 ſuch miles. But this is without any allowance for halts; which, as has been obſerved before, require a deduction of 8 parts in 100, to be made from the groſs amount of the whole journey, when applied to the purpoſes of geography.

I have already taken notice, that Mr. CARMICHAEL counted the camel's ſteps, in order to aſcertain a ſcale of diſtance; and I ſhall now give the reſult of his obſervations, as well as of Mr. HOLFORD's, who alſo counted the ſteps, and meaſured the length of a number of them on the ground. Mr. HUNTER's experiment was on too ſmall a ſcale to ground a calculation on. It is certain, that theſe reports of the number of ſteps during certain portions of time, and the meaſurement of a certain number of thoſe ſteps on the ground, furniſh a reſult that does not agree with the experiments on the great ſcale; ſuch as we have juſt related, and which appear to be ſuſceptible of greater accuracy than thoſe made in detail. But it will, nevertheleſs, be proper to give the reſults, and to make ſome remarks on them; if be only to prevent any perſon in future from founding a calculation on them.

Mr. CARMICHAEL counted the double ſteps, or rather the return of the ſame foot, of a camel on which he rode, for an hour together, on 20 different days; at times when, from the nature of the ground, he thought the greateſt variation took place, in the rate of motion. He found the greateſt number of ſteps to be 2420, the leaſt 2086; and the mean of the whole 20 hours, was 2200. Mr. HOLFORD reckoned the greateſt 2240, leaſt 2060; mean 2150. They both report the double ſtep to be 5 feet and an half. The reſult of the former account is 2,29 Britiſh miles *per* hour; of the latter 2,24; and each allowed his diſtance accordingly, in his journal: though nothing is more certain than that their computed diſtances fall very ſhort


ROUT
B
Beer
Scanderoon
Euphrates River
Aleppo
Salt Lake
Racca
Hagla
Mesopotamia
Carmichael's
Irwin, 1781.
Separation of the Great and Little Desert Routes.
Syrian Desert
Kirkesia ruins
Ain il Koom
Taiba ruin
Hems
Route, 1751.
Holford, 1780.
Jub il Gannam
Palmyra
LITTLE
Annah
Erzi or Irsah
GREAT
DESERT R.TE
Holford,
Irwin's. Route. 1781.
Uklet Hauran
Hit
Kubeſsa
Damaſcus
Arabian Desert
Anbar ruin
Rousvania
Carmichael, 1751.
DESERT
Al Kadder ruin
Meſji
Rahamah or Rackamah
Chal
10 5 0 10 20 30 40 50 60 70 80 90 100 200
Geographic Miles.
Carmichael's Route.
Irwin's.
Capper's where it deviates from Carmichael's.
Holford's.
Teixeira's acroſs the Chaldean Desert.

Sketch of the OUTES *acroſs the* DESERTS, *Between* Aleppo *and* Buſsorah. *1791.*



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ſhort of the truth. Mr. CARMICHAEL, for inſtance, reckons the diſtance from Aleppo to Buſſorah, by the road, at 720 Britiſh miles, although the direct diſtance itſelf ſcarcely falls ſhort of it. And Mr. HOLFORD's road diſtance alſo falls very ſhort. Even Mr. CARMICHAEL's higheſt number of paces, would exceed the mean rate given by the experiment at large, by a *ſixtieth* part only.

As theſe gentlemen's experiments differ only 50 ſteps, in the mean number, during the hour (one being 2200, the other 2150), that is, a 44th part, the error muſt be looked for elſewhere; and it probably originated in their meaſuring too ſmall a number of ſteps on the ground to found their calculation on.

The reaſon of this great variation in the number of paces, in a given time, is the plenty or ſcarcity of the Deſert ſhrubs, on which the camels feed, as they go on; and thus ſuch expements become almoſt uſeleſs, unleſs the quality of the Deſert was deſcribed in every part. As the hourly rate of Mr. CARMICHAEL, coincides with that of Mr. IRWIN, within a very ſmall fraction, although the one travelled in November and December, the other in March and April; it appears, that the ſeaſons have little or no effect in this particular: and it is therefore highly probable, that the ſhrubs may flouriſh in ſome parts of the Deſert, and be dried up in others, at one and the ſame ſeaſon.

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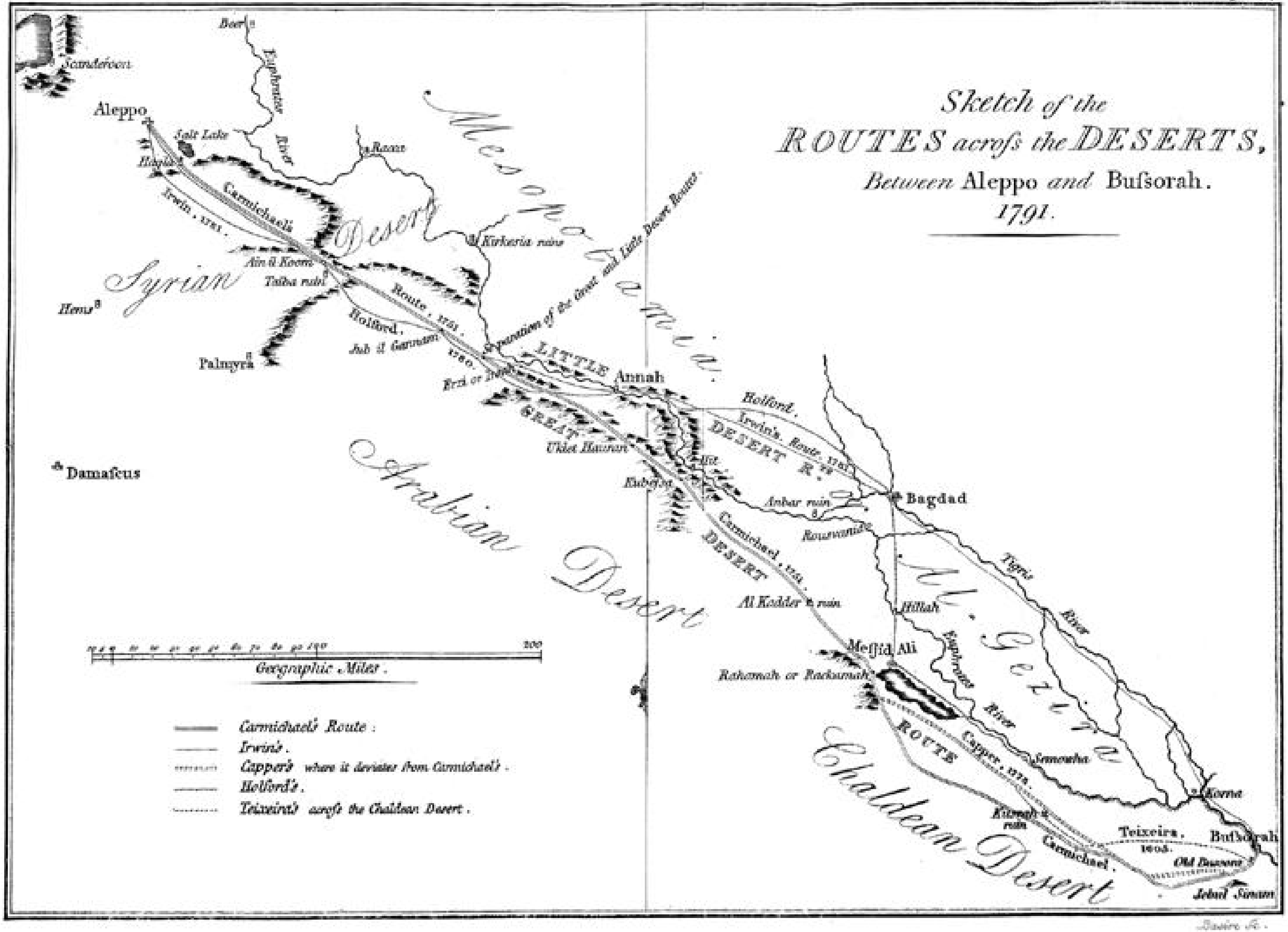

Sketch of the ROUTES acroſs the DESERTS, Between Aleppo and Buſsorah. 1791.

Carmichael's Route.
Irwin's.
Capper's where it deviates from Carmichael's.
Holford's.
Teixeira's acroſs the Chaldean Deſert.

Basire sc.